Tests of gated antiproton loss monitors for hollow electron beam collimation

Giulio Stancari

Tevatron Department Meeting
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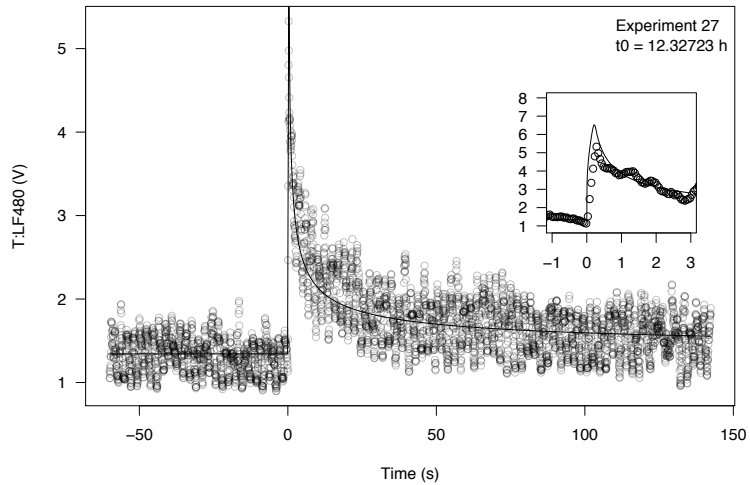
- Goals
  - collimation efficiency
  - effect of hollow electron lens on transverse beam diffusion



Local losses vs. time during collimator scan

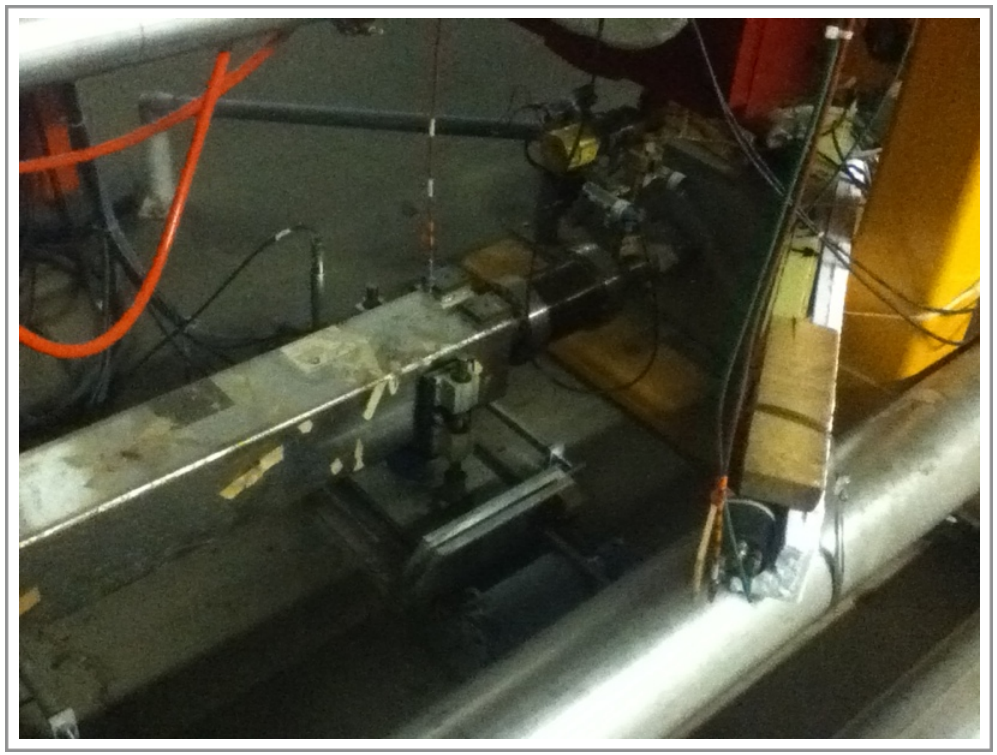
- Useful byproduct: measurement of transverse diffusion rates in the Tevatron (never done before)

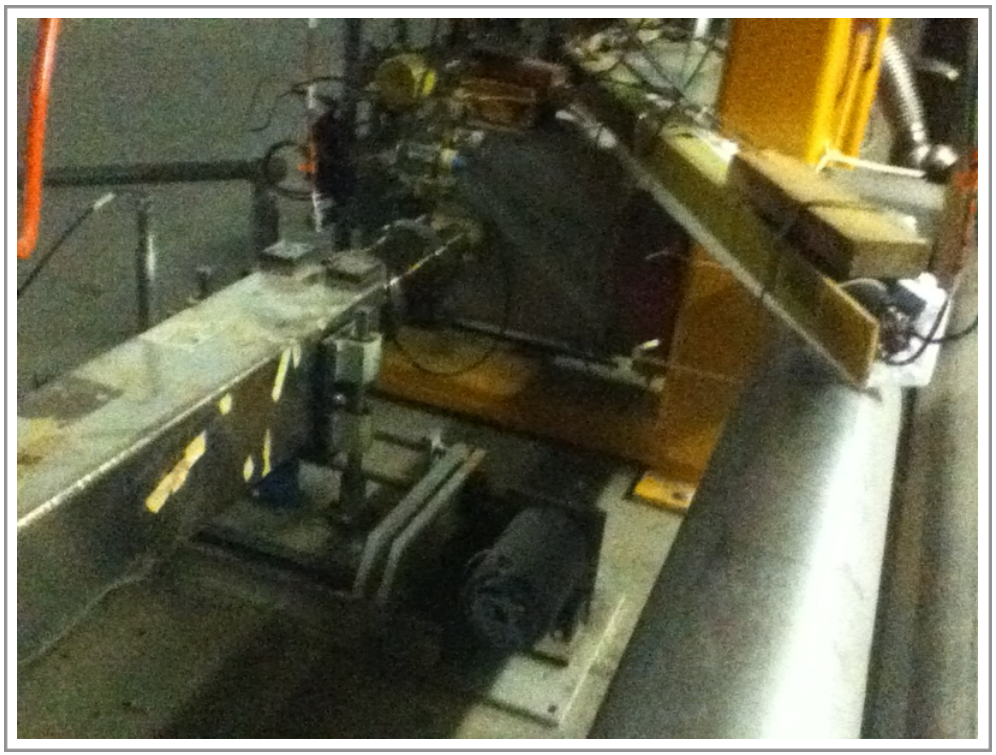
- E-lens yields high currents (0.4 to 1.1 A) when acting on 1 train or less

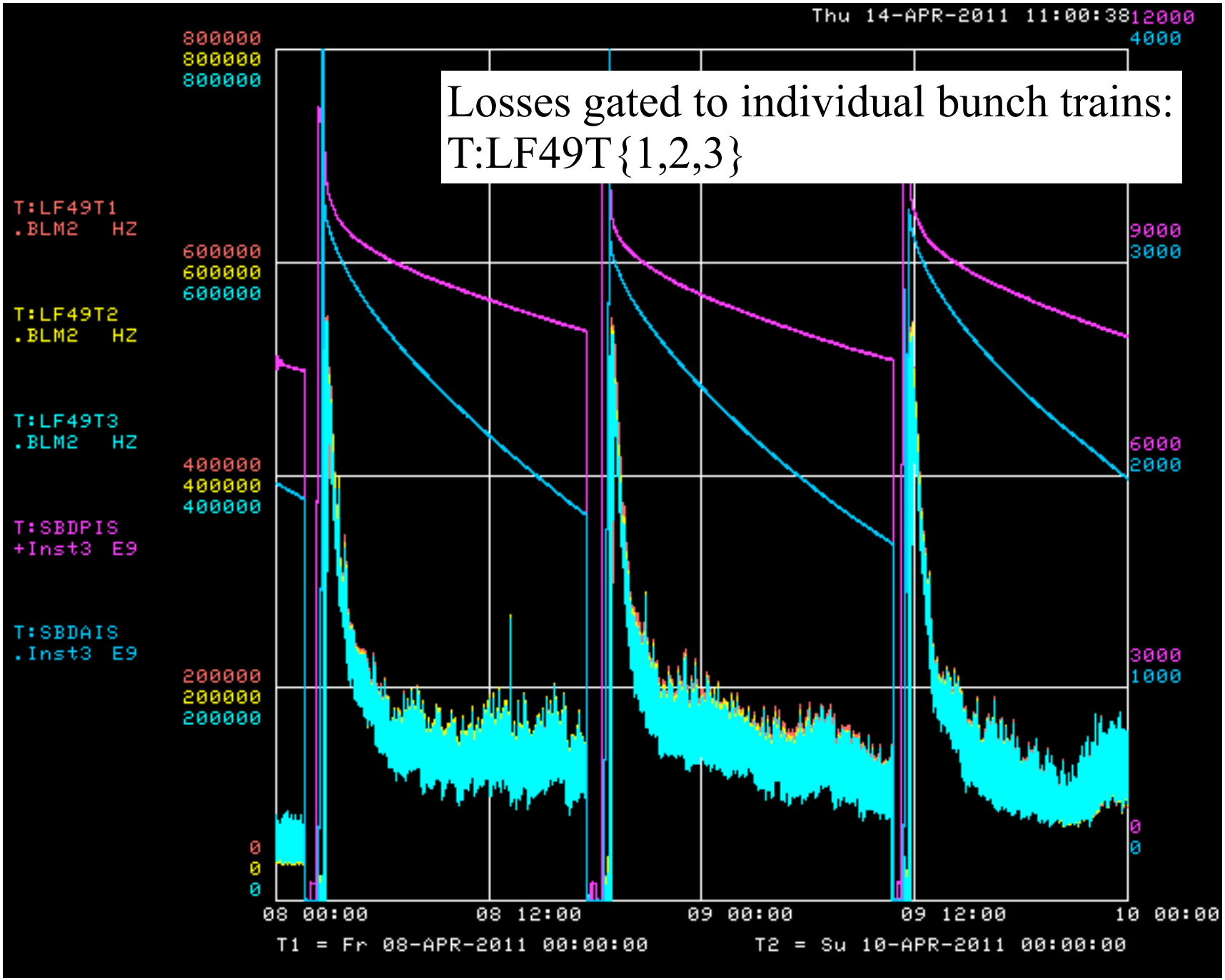
- Main observables are already gated: intensities, CDF/D0 luminosities and halo counters

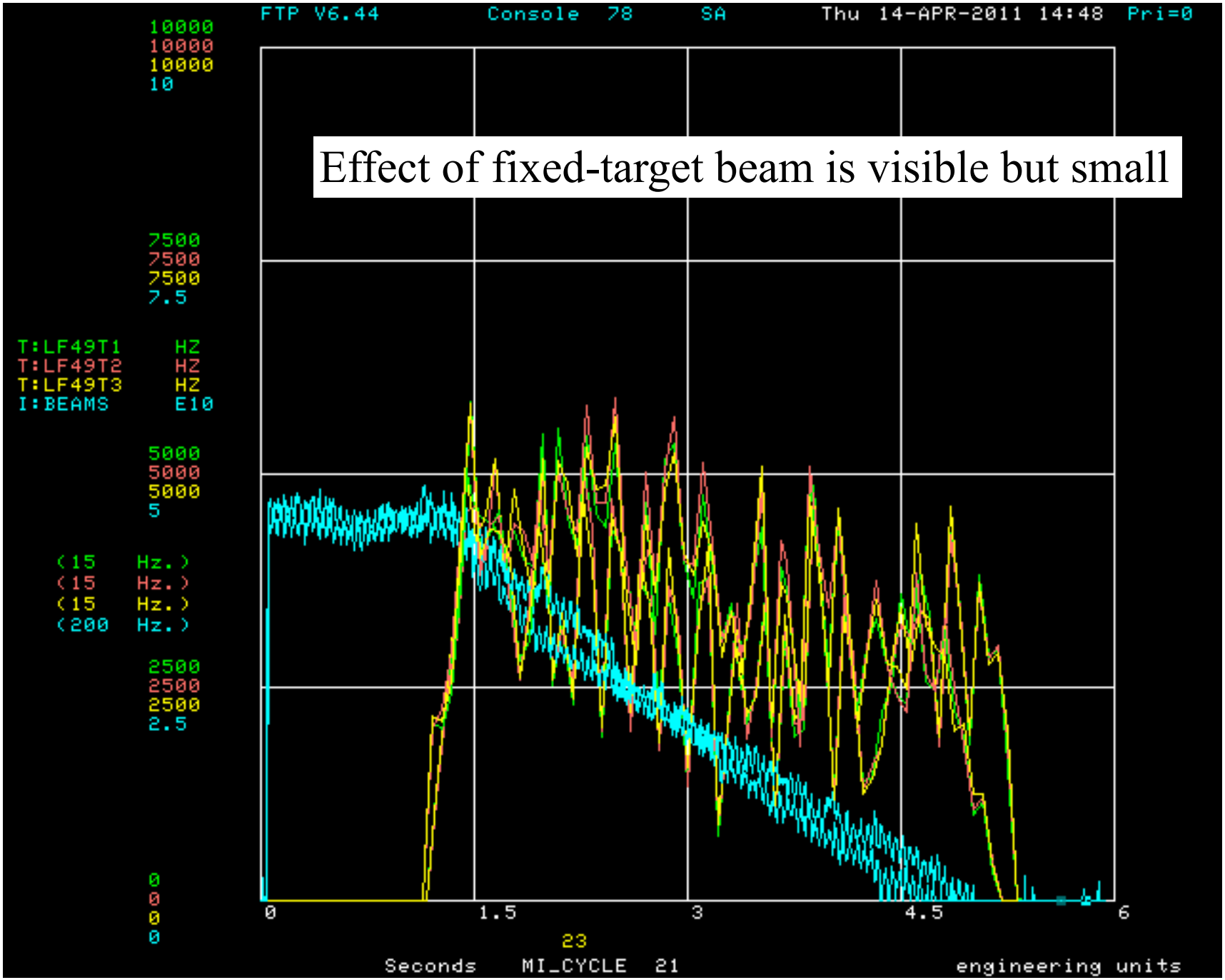
- Need gated loss monitors (at least train by train)

New scintillator paddles installed in March near F49 pbar absorber (Johnson, Still, Annala)

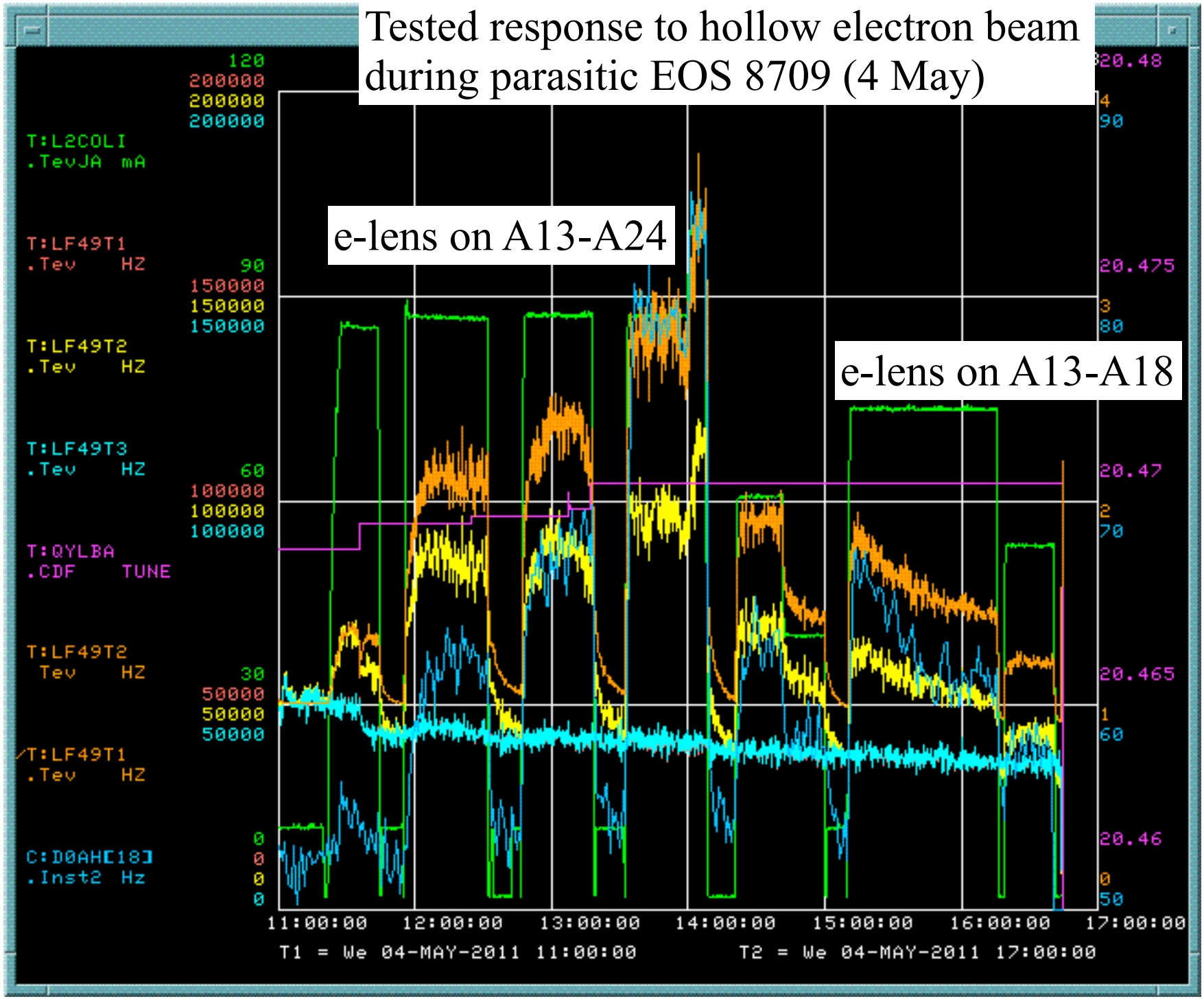


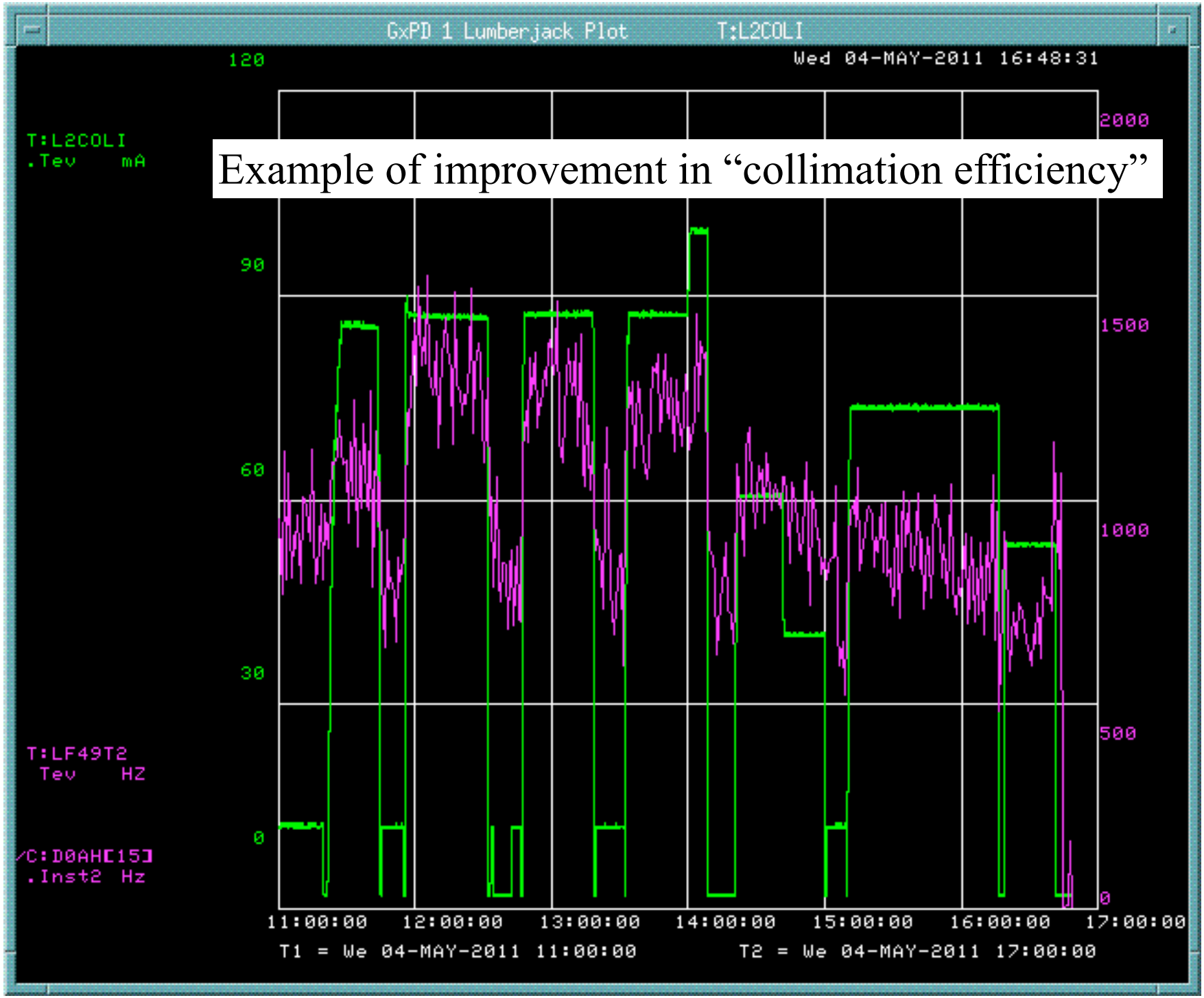



Losses gated to individual bunch trains:
T:LF49T{1,2,3}
Thu 14-APR-2011 11:00:38
T:LF49T1
.BLM2 HZ
T:LF49T2
.BLM2 HZ
T:LF49T3
.BLM2 HZ
T:SBDPIS
+Inst3 E9
T:SBDAIS
.Inst3 E9
800000
600000
400000
200000
0
12000
9000
6000
3000
0
4000
3000
2000
1000
0
08 00:00
08 12:00
09 00:00
09 12:00
10 00:00
T1 = Fr 08-APR-2011 00:00:00
T2 = Su 10-APR-2011 00:00:00


FTP V6.44 Console 78 SA Thu 14-APR-2011 14:48 Pri=0
Effect of fixed-target beam is visible but small
10000
10000
10000
10
7500
7500
7500
7.5
T:LF49T1 HZ
T:LF49T2 HZ
T:LF49T3 HZ
I:BEAMS E10
5000
5000
5000
5
(15 Hz.)
(15 Hz.)
(15 Hz.)
(200 Hz.)
2500
2500
2500
2.5
0
0
0
0
0
1.5
3
4.5
6
23
Seconds MI_CYCLE 21
engineering units

Tested response to hollow electron beam during parasitic EOS 8709 (4 May)





Example of improvement in “collimation efficiency”

- Signal from new gated loss monitors is good
- Will allow simultaneous measurements on affected and control bunch trains
- Response to e-lens well above sensitivity: during parasitic EOS 8709, 1E4 to 1E5 counts on top of 5E4 for typical currents and hole sizes
- Brief test of response to F49 collimator “baby steps” is desirable (a few minutes EOS)
- Ready for dedicated collimator scans: colliding beams, pbar only, proton only (depending on available time)